{In Archive} RE: OxyVinyl nickel WER (Battleground facility) - TPDES 01539)

Horne, Jim to: Michael Pfeil, Diane Evans 03/31/2010 12:03 PM

From: "Horne, Jim" <JDHorne@pbsj.com>
To: Michael Pfeil <MPFEIL@tceq.state.tx.us>, Diane Evans/R6/USEPA/US@EPA,
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Mike and Diane,

From the comments below, it appears that the biggest issue is with calculation of TWAs. I re-examined my spreadsheets (Adobe p. 140, p. 242, and p. 330) and found a systematic formula error that was propagated from the 1st iteration into the 2nd and 3rd data sets. The basic design for my spreadsheet has been used previously, but largely for 48-hr Ceriodaphnia tests. After adding additional columns to accommodate two additional sets of data, it appears that I did not update all of the cells that calculate TWAs. As a result, many of the TWAs were based on two measurements instead of all four. I will correct the data entries and re-run all of the stats and WER calculations this afternoon – more to come on that.

Diane, about you last question regarding the higher total and dissolved nickel values obtained in the 48h "old" samples of the simulated downstream water control group. The values were correctly transcribed from the analytical report (Adobe p. 326), but do not match-up well with the other measurements of what is essentially the same water (Albion Sample IDs MM-4504 & MM-4505, also on Adobe p. 326), except that the control "old" samples had mysids swimming about in it for 48-hr, whereas the other was poured-up just after the receiving water and effluent were mixed and allowed to stand for a couple of hours. The 48-hr "old" control sample was handled in the same timeframe and space as the nickel-spiked media; thus the potential for some degree of cross-contamination is real possibility.

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From: Michael Pfeil [mailto:MPFEIL@tceq.state.tx.us]
Sent: Wednesday, March 31, 2010 9:43 AM
To: Horne, Jim

Subject: Fwd: OxyVinyl nickel WER (Battleground facility) - TPDES 01539)

Jim-

This is from Diane Evans of EPA.

Are the differences really enough to change the FWER? Hopefully not, as I already sent the IOM to the permit writer.

Mike

>>> On 3/30/2010 at 12:04 PM, <Evans.Diane@epamail.epa.gov> wrote:

Hi Mike,

The electronic submittal of the Oxy Vinyls-Battleground WER study was very helpful. I've reviewed the study and have a several questions that you may wish to forward to the facility and/or to PBS&J.

There are a number of inconsistencies in the calculation of the time-weighted averages (TWAs) for nickel concentrations, primarily for the dissolved nickel concentrations. There are also a few other items which are also included below. Please note that for references to the main report, I used page numbers (at the bottom of each page). However, for comments on the Appendices, it was easier to reference the adobe page number.

I don't know exactly how close the permit is to being proposed , but do you want to let the TCEQ permit writer (Satya Dwivedula) know that the WER needs to be recalculated?

Diane
214-665-6677

Round 1 (mysids):

Lab water: The LC50 values for total nickel (Probit and TSK) in the summary table (Section 3.1.3) are slightly less than the statistical program printout in the Appendices (adobe page 142). Also, one TWA for total nickel was miscalculated in Table 2 (233 ug/l,, second concentration), but the correct value (241 ug/l) was used in the statistical calculations (adobe page 142). I don't know if this is the source of the slight discrepancy in LC50 values.

Simulated downstream water: The LC50 values for total nickel (Probit and TSK) in the summary table (Section 3.1.3) are less than the statistical program printout in the Appendices (adobe page 152). Also, I can't match the dissolved nickel values in the statistical calculations (adobe page 157) with the values in Table 3 (page 10). On page 10, the nominal concentrations are included as TWAs for dissolved nickel (only for simulated downstream water). However,

the dissolved nickel values on page 157 (statistical program) are different than either the nominal or measured (TWA) concentrations on page 10. For example, the nominal (and TWA) on page 10 for the first concentration is 221 ug/l. In the statistical program, a TWA of 245 ug/l was used. However, I calculate a TWA of 255 ug/l. Also, the LC50 values for dissolved nickel in the summary table in section 3.1.3 (page 4) do not match the statistical printouts in Appendix B (adobe page 157), but the question of what are the correct TWAs for dissolved nickel has to be resolved first.

Round 2:

Lab water: The LC50 values for dissolved nickel in the summary table in section 3.2.3 (page 6) do not match the statistical printouts in Appendix C (adobe page 249). Also, the TWAs are calculated correctly (Table 7 on page 13), but one concentration for dissolved nickel was not correctly transferred to the statistical calculations for lab water analyses (adobe page 249). The concentration of 456 ug/l, should be 448 ug/l according to Table 7. Although this is a minor difference, it is a concentration which brackets the LC50 and may be in the facility's favor (smaller denominator in calculation of WER).

Simulated downstream water: In Table 8, we believe that the time-weighted average (TWA) for dissolved nickel in simulated downstream water was calculated from the first two measurements (0-hour and 48 hour old), where as the TWA for total nickel were calculated from all four measurements over 96 hours (as the text portion of the report indicates). For example, the TWA for the highest concentration of dissolved nickel is 1975 ug/l (average of 1980 ug/l and 1970 ug/l). However, the TWA of all four measurements is 1860 ug/l. The 96-hour TWAs for all concentrations are less than the values used in Table 8 and in Appendix C. It's likely that the dissolved WER for round 2 is smaller than what is calculated, as the LC50 value for the simulated downstream water (numerator) is smaller.

Round 3:

Lab water (Table 10 in summary): The TWA for dissolved nickel in the lowest four concentrations (nominal 151-441 ug/l) do not appear to be correctly calculated. Using the values in this table, I calculate slightly higher TWAs of 135 ug/l, 203 ug/l, 298 ug/l and 425 ug/l. Since these values bracket the concentrations which killed 56% and 32%, the LC50 will likely be higher than what is found in Appendix D.

Also, the 96-hour LC50 values for dissolved nickel reported in section 3.3.3 of the summary section (page 8) do not quite match the statistical printouts in Appendix D (less than 1 ug/l difference, but doesn't appear to be due to rounding). However, that should be resolved with the recalculation with revised TWAs.

Simulated downstream water (Table 11 in summary): As in round 2, the TWAs for dissolved nickel in simulated downstream water were calculated with only the 0-hour and 48-hour old concentrations. Use of all four measurements results in higher TWAs for use in calculation of the LC50 values.

As with the lab water in round 3, the 96-hour LC50 values for dissolved nickel reported in section 3.3.3 of the summary section (page 8) do not match the statistical printouts in Appendix D. In this case, there is a difference of about 3 ug/l for the Probit analysis and 5 ug/l for the TSK analysis. I'm not sure if this is due to the correct TWA for site water being used in the summary calculations (but incorrect statistic sheets being included in Appendix D).

Finally, the 48-hour old nickel measurements in the simulated downstream water control (28 ug/l total and 26 ug/l dissolved) are higher than found in other rounds and in the 0-hour, 48-hour new and 96-hour old rounds for the same test. The page form the analytical laboratory (adobe page 326) includes the same information, so it doesn't appear that it is a transcription error. Are there any thoughts on why these higher levels at the 48-hour old measurement?